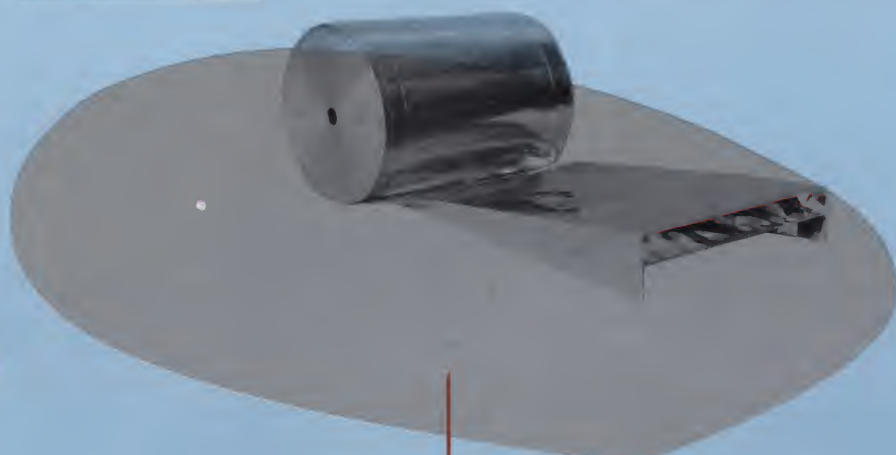
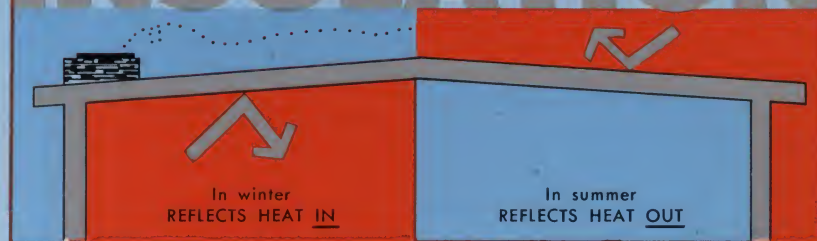


REFLECTIVE INSULATION



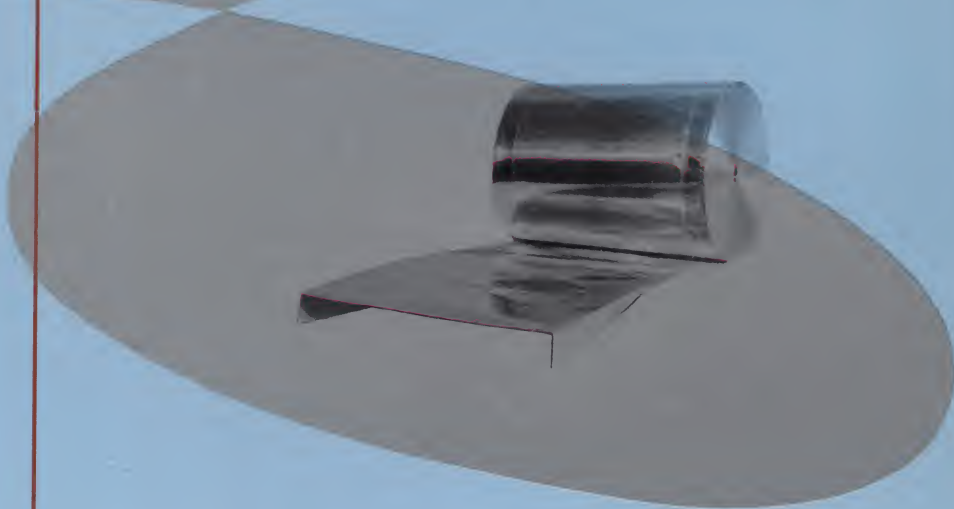
FOUR TYPES AVAILABLE FOR ALL INSULATION NEEDS

TYPE I—One Reflective Surface. Aluminum Foil bonded to one side of durable Kraft paper.

TYPE II—Two Reflective Surfaces. Aluminum Foil bonded to both sides of durable Kraft paper.

TYPE III—Three Reflective Surfaces. One sheet with Aluminum Foil bonded to one side and one sheet with the Aluminum Foil bonded to two sides of durable Kraft paper.

TYPE IV—Four Reflective Surfaces. Two sheets with Aluminum Foil bonded to both sides of durable Kraft paper.



LOUIS HAFERS CO.

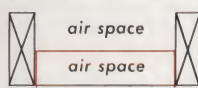
1514 CHESTNUT STREET
ALHAMBRA, CALIFORNIA



INSULATE WITH HAFERS ALUMINUM

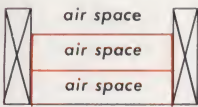


THERMAL RESISTANCE AND U-VALUES

CEILINGS
FOR VERTICAL HEAT FLOW

TYPE TWO

ATTIC SURFACE
AIR SPACE (ONE SIDE REFLECTIVE)
AIR SPACE (ONE SIDE REFLECTIVE)
GYPSUM BOARD
INSIDE SURFACE
TOTAL RESISTANCE
U-VALUE (1/R)



TYPE THREE

ATTIC SURFACE
AIR SPACE (ONE SIDE REFLECTIVE)
AIR SPACE (ONE SIDE REFLECTIVE)
AIR SPACE (ONE SIDE REFLECTIVE)
GYPSUM BOARD ($\frac{3}{8}$ ")
INSIDE SURFACE
TOTAL RESISTANCE
U-VALUE (1/R)

	DIRECTION OF HEAT FLOW			
	UP (WINTER)		DOWN (SUMMER)	
	NO INSUL.	INSUL.	NO INSUL.	INSUL.
TYPE TWO	.61	.61 1.84* 1.84*	.92	.92 7.82* 7.82*
	.27	.27	.27	.27
	.61	.61	.92	.92
TOTAL RESISTANCE	1.49	5.17	2.11	17.75
U-VALUE (1/R)	.67	.19	.47	.06
TYPE THREE	.61	.61 1.84* 1.84* 1.84*	.92	.92 7.82* 5.00* 5.00*
	.27	.27	.27	.27
	.61	.61	.92	.92
TOTAL RESISTANCE	1.49	7.01	2.11	19.93
U-VALUE (1/R)	.67	.14	.47	.05

* See Chart Below

FACTORIES & WAREHOUSES ("U" VALUES)

Typical Open Rafter Construction	Season	No Insulation	Air Space Thickness (inches)	Number of Reflective Air Spaces 2	Number of Reflective Air Spaces 3
1/2" plywood with built up type roof	Winter	.57	3/4" - 4"	.18	.14
	Summer	.47	3/4"	.12	.08
			1 1/2"	.08	.06
25/32" wood with built up type roof	Winter	.48	3/4" - 4"	.17	.13
	Summer	.40	3/4"	.11	.08
			1 1/2"	.08	.06
1 1/2" wood with built up type roof	Winter	.32	3/4" - 4"	.15	.12
	Summer	.28	3/4"	.10	.08
			1 1/2"	.07	.05
			4"	.05	.04

An example of cooling load reduction based on conditions prevailing at peak solar load with the roof temperature of 150 degrees, room temperature 75 degrees—temperature differential of 75 degrees:

Solar load transmitted through 1000 sq. ft. of 1/2" plywood roof $.47 \times 75^\circ = 35.25 \text{ BTU} \times 1000 = 35,250$

Solar load transmitted through 1000 sq. ft. of aluminum insulated roof $.06 \times 75^\circ = 4.50 \text{ BTU} \times 1000 \text{ sq. ft.} = 4,500$

Amount of solar heat stopped by Aluminum Insulation $= 30,750$

Expressed in tons of refrigeration (12,000 BTU's equal 1 Ton): heat stoppage per thousand sq. ft. Tons = 2.56

An example of heating load reduction based on 70° inside temperature and 30° outside temperature = 40 degrees temperature differential:

Heat loss through 1000 sq. ft. of 1/2" plywood roof $.57 \times 40^\circ = 22.80 \text{ BTU} \times 1000 \text{ sq. ft.} = 22,800$

Heat loss through 1000 sq. ft. of Type III Aluminum insulated roof $.14 \times 40^\circ = 5.60 \text{ BTU} \times 1000 \text{ sq. ft.} = 5,600$

Heat loss stopped by Aluminum Insulation

AVERAGE INSULATION VALUES OF REFLECTIVE AIR SPACES FROM ASH&AC GUIDE, 1956

Data based on Housing Research Paper 32, "The Thermal Insulating Value of Air Spaces," Housing and Home Finance Agency, U. S. Government.

Location & Position of Air Space	Season	Reflective Air Space Thickness (Inches)	Thermal Resistance (R) Number of Reflective Air Spaces		
			1	2	3
Ceilings & Joists (Horizontal)	Summer	3/4 1-1/2 4	3.23 5.00 7.82	6.46 10.00 15.64	9.69 15.00 —
	Winter	3/4 - 4	1.84	3.68	5.52
Walls (Vertical)	Summer	3/4 - 4	3.49	6.98	10.47
	Winter	3/4 - 4	2.64	5.28	7.92
Floors (Over Crawl Space)	Summer	3/4 - 4	2.47	4.94	7.41
	Winter	3/4 1-1/2 4	3.57 5.56 8.94	7.14 11.12 17.88	10.71 — —
Rafters (45° Slope)	Summer	3/4 - 4	4.07	8.14	12.21
	Winter	3/4 - 4	2.08	4.16	6.24

1. The above table represents values for average summer and winter conditions for air spaces having an average effective emissivity (E) of .05 (reflective surface and one average surface).

2. These values may be used in conjunction with corresponding values for typical building materials to calculate the overall "U" value of contemplated or existing structures.

1 reflective air space—One layer single-faced Reflective Insulation.

2 reflective air spaces—One layer double-faced Reflective Insulation.

Hafers Aluminum Reflective Insulation is composed of sheets of *Lifetime* Aluminum bonded to tough kraft paper for easy handling, and for lasting efficiency.

Clean, odorless Hafers Reflective Insulation costs substantially less than conventional bulk insulation. Yet despite its economy, Hafers Reflective Insulation holds its shape year after year—does not pack down or absorb moisture. It retains its heat-reflecting efficiency, too, in spite of dust and age. Equally important, the heat-reflecting quality of Hafers Aluminum Reflective Insulation means that it *absorbs* very little heat. Also, because of its light weight, it *retains* virtually no heat at all. These two qualities of aluminum provide greater sleeping comfort in summer because rooms are not wrapped in a warm “blanket” of heat stored during the day.

- Clean, easy to handle
- Insulation efficiency without bulk
- Applies quickly with stapler and knife
- Reduces fuel costs
- Reduces temperatures as much as 20° in summer
- Reflects 95 to 97% of radiant heat
- An excellent vapor barrier

SPECIFICATIONS

INSULATION: Hafers Aluminum Building Insulation type—as manufactured by Louis Hafers Company, 1514 Chestnut Street, Alhambra, California, ATlantic 9-5015—CUmberland 3-7186. (Note: Specify type 1, 2, 3, or 4).

CEILING AND WALL: After electrical inspection and before lathing, install aluminum foil insulation between exterior wall studs and between ceiling joists stapled 8" o.c.

OPEN RAFTER FACTORY ROOF: After necessary inspections, and after all fixtures have been hung from the rafters, install aluminum insulation on the bottom of the rafters, stapled six inches on center and properly fastened to the pur-lins or girders.
(Provides a semi-finished ceiling that never needs painting.)

FLOOR: After flooring has been laid, install aluminum foil blanket from underneath floor joists in such manner as to provide reflective air spaces and continuous vapor barrier.

Hafers Aluminum Insulation is manufactured for 12", 16" and 24" centers in continuous length rolls of 500 sq. ft. each. Also available in 250 sq. ft. rolls.

Comparative efficiency

(authority: U. S. Bureau of Standards)

Building Materials and Standards Report BMS-52, published by the National Bureau of Standards (United States Department of Commerce), rates 5 insulation materials in their “order of decreasing effectiveness in protecting the ceiling against summer heat” as follows:

- 1 Two layers of aluminum foil (both sides of each layer reflecting).
- 2 Full thick (3 $\frac{5}{8}$ ") rock wool.
- 3 One layer of aluminum foil (both sides reflecting).
- 4 Full thick (3 $\frac{5}{8}$ ") glass wool.
- 5 2" of rock wool or 2" of wood-fibre blanket.

Comparative resistance of materials to vapor transmission *

Material	Loss in grains (per sq. ft. per hour)	
	Low	High
Duplex paper covered with aluminum foil one side.....	.001	.107
Aluminum foil mounted on paper backing.....	.003	.005
$\frac{3}{8}$ " Gypsum lath with aluminum foil backing.....	.061	.277
Polyethylene films 0.004 thick.....	.097	.108
Insulation back-up paper.....	.133	.583
30-30-30 untreated duplex asphalt laminated.....	.447	1.081
30 pound asphalt felt.....	.498	3.022
30-60-30 untreated duplex asphalt laminated.....	.527	—
1 coat rubber base paint		
: 1 coat rubber base paint.....	.602	.858
1 coat pigmented primer and sealer		
: 1 coat oil-base flat paint.....	.815	.976

*Source: Report R-1710, U. S. Forest Products Laboratory (Table excerpted to show only those materials rated as giving “adequate moisture protection”).

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Clean, odorless Hafers Reflective Insulation costs substantially less than conventional bulk insulation. Yet despite its economy, Hafers Reflective Insulation holds its shape year after year—does not pack down or absorb moisture. It retains its heat-reflecting efficiency, too, in spite of dust and age. Equally important, the heat-reflecting quality of Hafers Aluminum Reflective Insulation means that it *absorbs* very little heat. Also, because of its light weight, it *retains* virtually no heat at all. These two qualities of aluminum provide greater sleeping comfort in summer because rooms are not wrapped in a warm “blanket” of heat stored during the day.

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- Insulation e
- Applies quic
- Reduces fuel
- Reduces temp
- Reflects 95 to
- An excellent

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From the collection of:

Mike Jackson, FAIA

INSULATION: Hafers
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sq. ft. per hour)

Low	High
01	.107
03	.005
61	.277
97	.108
33	.583
47	1.081
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17	—
12	.858
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